

Secret Lock

036

W. Zeiller

This secret lock, unlike a conventional code lock, gives away no hints to the unwanted visitor as to its existence: there are no buttons, switches or keypads. No code sequence need be learnt: you simply need an inconspicuous key.

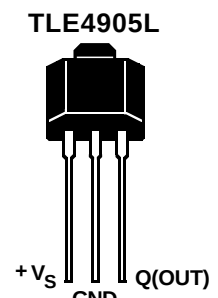
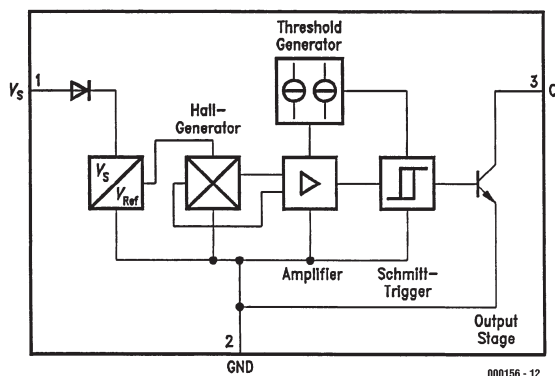
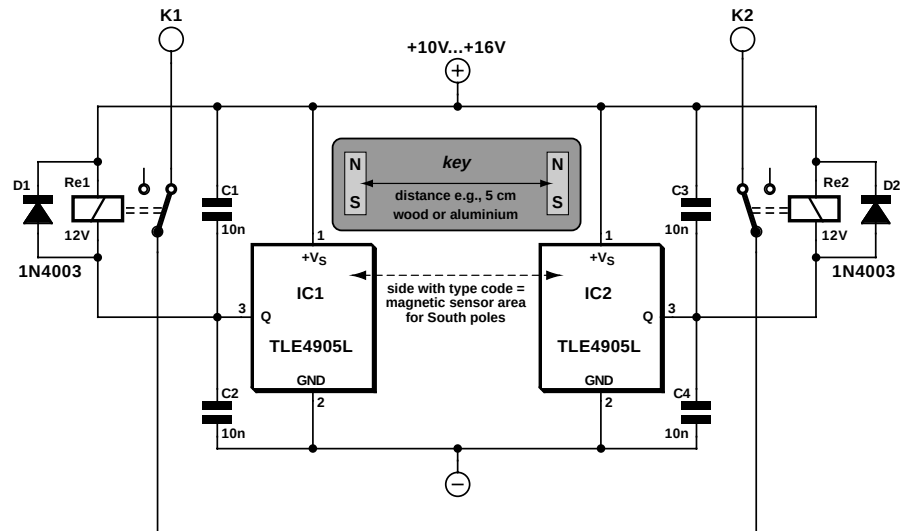
The idea is based on two magnetically-operated switches which, when operated simultaneously, cause two relays to close. These in turn could actuate an electric door latch or start a garage door motor. This would not be particularly noteworthy (and rather easy to defeat) if simple reed switches were used, since they do not depend on the polarity of the magnetic field: they react equally to the north or the south pole of a magnet. Instead we use Hall effect ICs, which only react to south poles.

In this way the would-be intruder, carrying just a powerful permanent magnet in his pocket, is frustrated in his nefarious deeds: horseshoe and bar magnets do not have two south poles. And if that is not secure enough, you can always add further Hall effect ICs and relays: just like a lock with more levers.

The sensor used in the circuit shown in **Figure 1** is smaller than a transistor, and yet contains rather more: a unipolar sensing surface for the magnetic field, Hall generator and threshold generator, amplifier, Schmitt trigger and output transistor. With a field stronger than 20 millitesla the open-collector output transistor is turned on. The series-connected contacts of the 12 V miniature relays then complete the circuit via connection L. Relays with a coil current of 50 mA or less should be used in order not to overload the ICs.

The Hall effect ICs are fitted or glued at least 5 cm apart behind a sheet of glass, plastic or aluminium (perhaps the letterbox or doorbell), at most 4 mm thick, with the component marking towards the key. In no circumstances should iron or steel be used as these screen the sensors from the magnetic field. The sensors can either be wired to directly or fitted on a piece of perforated board. The position of the sensors should be suitably marked on the outside.

The simplest way to make a key is from a piece of square section wood in which two small holes are bored for two cylindrical magnets (as used with reed switches).



The two magnets should be glued in the same way round, which can easily be tested by checking that the poles repel. Alternatively, of course, the magnets can be fixed in a flat plastic box using hot-melt glue. Remember that only one side of the key will open the lock.

The secret lock can be safely used outside as long as it is fitted in a suitable watertight enclosure. It can save money compared to the services of a locksmith, and it will resist even the professional burglar. The lock is vandal-proof, operates independent of temperature, requires no battery in the key, can be cheaply extended and provided with any number of keys. The Hall effect ICs (Conrad Electronics order code 147508) are inexpensive. The operating voltage depends on the relays chosen, and should lie between 6 V and 24 V. The standby current for two ICs is about 7 mA at 12 V.

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